

CONTENTS

Abstract	12
Introduction	13
Chapter 1. Background, Scientific Context, and Research Design of the Project	15
Chapter 2. Pinyon House: Natural Setting, Archaeological Procedures, and Features	21
Archaeological Procedures	23
Surface Features	25
Structures	28
Standing Structures	28
Structural Depressions	32
Rock Rings	42
Rock Dam	45
Pinyon House South	46
Chapter 3. Pinyon House: Artifact Assemblage	49
Milling Equipment	49
Millingstones	49
Manos	51
Pestle	53
Pitted Stone	53
Ceramics	53
Owens Valley Brown Ware	55
Miscellaneous Fired Clay	57
Projectile Points	57
Humboldt Series	58
Little Lake Series	59
Elko Series	60
Rose Spring Series	62
Cottonwood Series	65
Desert Side-notched	65
Untyped Point	67
Untypable Fragments	67
Other Chipped Stone Artifacts	67
Bifaces	67
Roughouts and Blanks	70
Drills	72
Unifaces	72
Cores	73
Debitage	74
Other Artifacts	76
Hammerstones	76
Shaft Smoother	76
Abraders	76
Pendant	77
Incised Stones	77
Miscellaneous Artifacts of Stone	78

CONTENTS

Abstract	12
Introduction	13
Chapter 1. Background, Scientific Context, and Research Design of the Project	15
Chapter 2. Pinyon House: Natural Setting, Archaeological Procedures, and Features	21
Archaeological Procedures	23
Surface Features	25
Structures	28
Standing Structures	28
Structural Depressions	32
Rock Rings	42
Rock Dam	45
Pinyon House South	46
Chapter 3. Pinyon House: Artifact Assemblage	49
Milling Equipment	49
Millingstones	49
Manos	51
Pestle	53
Pitted Stone	53
Ceramics	53
Owens Valley Brown Ware	55
Miscellaneous Fired Clay	57
Projectile Points	57
Humboldt Series	58
Little Lake Series	59
Elko Series	60
Rose Spring Series	62
Cottonwood Series	65
Desert Side-notched	65
Untyped Point	67
Untypable Fragments	67
Other Chipped Stone Artifacts	67
Bifaces	67
Roughouts and Blanks	70
Drills	72
Unifaces	72
Cores	73
Debitage	74
Other Artifacts	76
Hammerstones	76
Shaft Smoother	76
Abraders	76
Pendant	77
Incised Stones	77
Miscellaneous Artifacts of Stone	78

Worked Bone	79
Bone Beads	79
Other Worked Bone	79
Beads of Shell and Stone	79
Shell Beads	79
Steatite Disk Beads	80
Minerals	80
Artifacts of Wood	81
Pinyon Hooks	81
Cone Paddle	82
Miscellaneous Artifacts of Wood	83
Historic Artifacts	83
Metal Containers	83
Glass	86
Levi-Strauss Clothing Findings	88
Glass Buttons	88
Miscellaneous Historic Artifacts	88
Unmodified Vertebrate Faunal Remains	89
Plant Macrofossils	89
<i>Pinus monophylla</i>	90
Other Taxa	91
Chapter 4. Pinyon House: Chronology, Spatial Distributions, and	
Summary Interpretations	92
Chronology	92
Intrasite Spatial Patterning	96
Interpretation	106
Early Occupation: 3000 B.C.-A.D. 300	106
Main Occupation: A.D. 300-A.D. 1930	107
Chapter 5. Two Eagles: Natural Setting, Archaeological Procedures,	
and Features	111
Archaeological Procedures	112
Surface Features	113
Petroglyph	113
Rock Rings	114
Discussion	126
Chapter 6. Two Eagles: Artifact Assemblage	128
Milling Equipment	128
Millingstones	128
Manos	129
Battered Cobbles	131
Ceramics	132
Owens Valley Brown Ware	132
Worked Sherd	135
Projectile Points	135
Great Basin Stemmed Point	136
Elko Series	136
Rose Spring Series	137
Cottonwood Series	138

Desert Side-notched	138
Untypable Projectile Point Fragments	139
Other Chipped Stone Artifacts	140
Bifaces	140
Roughouts	141
Drills	142
Unifaces	142
Core Tools	142
Cores	143
Debitage	144
Miscellaneous Debitage	146
Miscellaneous Artifacts	148
Steatite Vessel Sherds	148
Pipe Preform	148
Pendants	148
Incised Stones	149
Worked Bone	150
Bone Bead	150
Other Worked Bone	150
Beads of Shell and Stone	151
Minerals	151
Historic Artifacts	152
Unmodified Vertebrate Faunal Remains	152
Plant Macrofossils	153
Chapter 7. Two Eagles: Chronology, Spatial Distributions, and	
Summary Interpretations	154
Chronology	154
Spatial Patterning	156
Implications	163
Chapter 8. Crater Middens: Natural Setting, Archaeological Procedures,	
and Features	165
Site Description and Archaeological Procedures	166
Surface Features	169
Bedrock Milling Facilities	169
Pitted Boulder	176
Stratigraphy and Subsurface Features	176
Stratigraphy	176
Subsurface Features	177
Structures	178
Excavated Rock Rings	178
Unexcavated Rock Rings	190
Miscellaneous Rock Structures	195
Discussion	196
Chapter 9. Crater Middens: Artifact Assemblage	199
Milling Equipment	199
Millingstones	199

Manos	208
Other Milling Equipment	214
Ceramics	217
Owens Valley Brown Ware	217
Gray Ware	224
Red Ware	224
Other Ceramic Artifacts	225
Projectile Points	227
Humboldt Series	227
Elko Series	227
Rose Spring Series	228
Eastgate Series	234
Cottonwood Series	234
Desert Side-notched	236
Untypable Projectile Point Fragments	238
Discussion	238
Other Chipped Stone Artifacts	239
Bifaces	239
Roughouts	245
Point Blanks	246
Drills	246
Unifaces	248
Denticulate Eccentrics	249
Choppers	250
Cores	251
Debitage	251
Miscellaneous Debitage	257
Trimming Flakes	257
Additional Artifacts of Stone	257
Shaft Smoothers	257
Abraders	258
Steatite Artifacts	258
Pendants	260
Incised Stones	261
Miscellaneous Artifacts	262
Worked Bone	264
Bone Beads	264
Bone Tubes	265
Awls	265
Flakers	266
Spatulas	266
Side-scrapers	266
Miscellaneous Worked Bone	267
Beads of Shell, Stone, and Glass	269
Minerals	271
Historic Artifacts	274

Unmodified Vertebrate Faunal Remains	278
Other Unmodified Organic Material	282
Chapter 10. Crater Middens: Plant Macrofossils	284
Methods	284
Analysis	284
Results	285
Sample Constituents	285
Analysis	291
Seasonal Implications	295
Subsistence Implications	299
Chapter 11. Crater Middens: Chronology, Spatial Distributions, and Summary Interpretations	303
Chronology	303
Spatial and Temporal Variation	310
Interpretations	314
Synopsis of Site History	320
Cowhorn/Baker Phase (0 B.C./A.D.—A.D. 1300)	320
Klondike Phase (A.D. 1300—Historic Period)	320
Summary	321
Discussion	323
Implications	325
Chapter 12. Synthesis, Interpretation, and Implications	326
Temporal Relationships	326
Functional Relationships	327
Crater Middens Subsistence-Settlement System (A.D. 600—Historic Period)	329
Temporal Change	331
The Problem of Obsidian Hydration: Systematic Error or Systemic Behavior?	331
Tool Supply and Demand in the Crater Middens Subsistence-Settlement System	333
More on Supply and Demand: Tool Completeness	333
Discussion and Implications	337
Implications for Earlier Models	338
The Larger Implications of this Study	342
References	348

TABLES

1.1. Correspondence Between Artifact Number and Provenience for Pinyon House	19
1.2. Correspondence Between Artifact Number and Provenience for Two Eagles	19
1.3. Correspondence Between Artifact Number and Provenience for Crater Middens	20
2.1. Characteristics of Rock Rings at Pinyon House	45
3.1. Distribution of Milling Equipment at Pinyon House	51
3.2. Distribution of Ceramic Artifacts at Pinyon House	53
3.3. Characteristics of Owens Valley Brown Ware Sherds from Pinyon House	56
3.4. Robinson's Indices of Agreement Between Owens Valley Brown Ware Sherds from Pinyon House and Owens Valley Brown Ware from Two Eagles and Crater Middens	57
3.5. Distribution of Projectile Points at Pinyon House	58

3.6. Metrical Data for Rose Spring Projectile Points from Pinyon House	64
3.7. Metrical Data for Cottonwood and Desert Side-notched Projectile Points from Pinyon House	65
3.8. Phase Composition of Projectile Point Assemblages from Pinyon House and 1972 Survey Pinyon Camps	68
3.9. Distribution of Other Chipped Stone Artifacts at Pinyon House	69
3.10. Metrical Data for Bifaces from Pinyon House	70
3.11. Metrical Data for Roughouts and Point Blanks from Pinyon House	70
3.12. Metrical Data for Unifaces from Pinyon House	74
3.13. Metrical Data for Cores from Pinyon House	74
3.14. Distribution, Composition, and Metrical Attributes of Debitage from Pinyon House	75
3.15. Distribution of Other Artifacts of Stone and Worked Bone at Pinyon House	77
3.16. Distribution of Shell and Steatite Beads at Pinyon House	80
3.17. Distribution of Minerals at Pinyon House	81
3.18. Distribution of Artifacts of Wood at Pinyon House	81
3.19. Distribution of Historic Artifacts at Pinyon House	85
3.20. Distribution of Unmodified Vertebrate Faunal Remains at Pinyon House	89
3.21. Plant Macrofossils Recovered During Excavation at Pinyon House	89
3.22. Plant Macrofossils Recovered by Flotation from Features at Pinyon House	90
4.1. Approximate Chronological Order for Structures Excavated at Pinyon House	93
4.2. Obsidian Hydration Rim Measurements for Pinyon House	94
4.3. Distribution of Major Categories in Gridded Area at Pinyon House	97
4.4. Spatial Association of Major Categories in Gridded Area at Pinyon House	98
5.1. Description of Strata at Two Eagles	113
5.2. Attributes of Unexcavated Structures at Two Eagles	115
6.1. Distribution of Milling Equipment at Two Eagles	129
6.2. Metrical Data for Millingstones from Two Eagles	129
6.3. Metrical Data for Battered Cobbles from Two Eagles	131
6.4. Distribution of Ceramic Artifacts at Two Eagles	133
6.5. Characteristics of Owens Valley Ware Sherds from Two Eagles	134
6.6. Robinson's Indices of Agreement Between Owens Valley Brown Ware Sherds from Two Eagles and Owens Valley Brown Ware from Pinyon House and Crater Middens	135
6.7. Distribution of Projectile Points at Two Eagles	136
6.8. Metrical Data for Rose Spring, Cottonwood, and Desert Side-notched Projectile Points from Two Eagles	137
6.9. Phase Composition of Projectile Point Assemblages from Two Eagles and Other 1972 Survey Desert Scrub Occupation Sites	139
6.10. Distribution of Other Chipped Stone Artifacts at Two Eagles	141
6.11. Metrical Data for Certain Chipped Stone Artifact Categories from Two Eagles	141
6.12. Distribution, Composition, and Metrical Attributes of Debitage from Two Eagles	144
6.13. Debitage Mean Weights by Material for Pinyon House and Two Eagles	145
6.14. Distribution of Miscellaneous Debitage at Two Eagles	146
6.15. Distribution of Miscellaneous Artifact Categories at Two Eagles	149
6.16. Distribution of Minerals at Two Eagles	151
6.17. Distribution of Unmodified Vertebrate Faunal Remains at Two Eagles	152
7.1. Obsidian Hydration Rim Measurements for Two Eagles	155
7.2. Distribution of Major Categories in Gridded Area at Two Eagles	157
7.3. Spatial Association of Major Categories in Gridded Area at Two Eagles	159
8.1. Dimensions by Midden of Surface Lithic Scatters and Middens and Sample Size and Distribution of Surface Collections and Excavations at Crater Middens	169

9.1. Distribution of Milling Equipment at Crater Middens	200
9.2. Subsurface Distribution of Milling Equipment at Crater Middens	201
9.3. Metrical Data for Millingstones from Crater Middens	202
9.4. Metrical Data for Manos, Battered Cobbles, and Pestles from Crater Middens	211
9.5. Distribution of Ceramic Artifacts at Crater Middens	218
9.6. Subsurface Distribution of Ceramic Artifacts at Crater Middens	219
9.7. Characteristics of Owens Valley Brown Ware Sherds from Crater Middens	220
9.8. Robinson's Indices of Agreement Between Owens Valley Brown Ware Sherds from Crater Middens and Owens Valley Brown Ware from Pinyon House and Two Eagles	221
9.9. Distribution of Projectile Points at Crater Middens	229
9.10. Subsurface Distribution of Projectile Points at Crater Middens	230
9.11. Metrical Data for Certain Projectile Point Types from Crater Middens	233
9.12. Phase Composition of Projectile Point Assemblages from Crater Middens, Pinyon House, Two Eagles, and Other 1972 Survey Occupation Sites and Pinyon Camps	239
9.13. Distribution of Other Chipped Stone Artifacts at Crater Middens	240
9.14. Subsurface Distribution of Other Chipped Stone Artifacts at Crater Middens	241
9.15. Metrical Data for Bifaces, Roughouts, and Point Blanks from Crater Middens	242
9.16. Metrical Data for Flake Drills from Crater Middens	243
9.17. Metrical Data for Unifaces, Choppers, and Cores from Crater Middens	250
9.18. Distribution, Composition, and Metrical Attributes of Debitage from Crater Middens	252
9.19. Distribution, Composition, and Metrical Attributes of Subsurface Debitage from Crater Middens	252
9.20. Distribution of Other Stone Artifacts at Crater Middens	259
9.21. Subsurface Distribution of Other Stone Artifacts at Crater Middens	260
9.22. Distribution of Worked Bone at Crater Middens	262
9.23. Subsurface Distribution of Worked Bone at Crater Middens	263
9.24. Distribution of Shell Beads and Shell Bead Refuse at Crater Middens	269
9.25. Subsurface Distribution of Shell Beads and Shell Bead Refuse at Crater Middens	270
9.26. Distribution of Steatite Disk Beads at Crater Middens	271
9.27. Subsurface Distribution of Steatite Disk Beads at Crater Middens	272
9.28. Distribution of Glass Beads at Crater Middens	273
9.29. Subsurface Distribution of Glass Beads at Crater Middens	274
9.30. Distribution of Minerals at Crater Middens	275
9.31. Subsurface Distribution of Minerals at Crater Middens	276
9.32. Distribution of Historic Artifacts at Crater Middens	277
9.33. Subsurface Distribution of Historic Artifacts at Crater Middens	278
9.34. Distribution of Unmodified Vertebrate Faunal Remains and Other Unmodified Organic Material at Crater Middens	279
9.35. Subsurface Distribution of Unmodified Vertebrate Faunal Remains and Other Unmodified Organic Material at Crater Middens	280
10.1. Distribution of Plant Macrofossils at Crater Middens	286
10.2. Individual Occurrences of Most Common, Midranking, and Least Common Taxa Represented by Plant Macrofossils at Crater Middens	293
10.3. Quantity Observed for Individual Occurrences of Most Common, Midranking, and Least Common Taxa Represented by Plant Macrofossils at Crater Middens	294
10.4. Seasonal Distribution of Taxa Represented by Plant Macrofossils at Crater Middens	296
10.5. Seasonal Patterning in Plant Macrofossils from Crater Middens	297
10.6. Principal Plants Contributing to the Diet of the Northern Owens Valley Paiute	300

11.1. Radiocarbon Dates for Crater Middens	304
11.2. Obsidian Hydration Rim Measurements and Dates for Crater Middens	305
11.3. Distribution of Typable Projectile Points by Phase at Crater Middens	306
11.4. Summary of Chronometric Information for Crater Middens	308
11.5. Raw Counts for Major Artifact Categories in Local Assemblages at Crater Middens	311
11.6. Adjusted Residuals for Major Artifact Categories in Local Assemblages of N > 400 at Crater Middens	313
11.7. Adjusted Residuals for Major Artifact Categories Other than Debitage in Local Assemblages of N > 400 at Crater Middens	314
11.8. Adjusted Residuals or Directional Values for Major Artifact Categories in All Assemblages at Crater Middens	315

FIGURES

1.1. Map of northern Owens Valley showing location of Pinyon House, Two Eagles, Crater Middens, and major geographical features	18
2.1. View of Pinyon House from the east	21
2.2. Contour map of Pinyon House locating major features	22
2.3. Surface collection grid system used at Pinyon House	25
2.4. Rock art panel associated with small artifact scatter north of the main site of Pinyon House	26
2.5. Structure 14 (standing lodge) at Pinyon House	29
2.6. Structure 7 (standing windbreak) at Pinyon House	32
2.7. Floor maps of Structures 14 (standing lodge) and 7 (standing windbreak) at Pinyon House	33
2.8. Floor maps of Structures 1, 2, and 3 (structural depressions) at Pinyon House	34
2.9. Exposed floor of Structure 3 (structural depression)	38
2.10. Floor maps of Structures 4, 10, 12, and 13 (structural depressions) at Pinyon House	40
2.11. Floor maps of Structures 5 and 6 (rock rings) at Pinyon House	43
2.12. Floor maps of Structures 8 and 11 (rock rings) and Structure 9 (rock dam) at Pinyon House	44
2.13. Exposed floor of Structure 1 (structural depression) at Pinyon House South	47
2.14. Floor map of Structure 1 (structural depression) at Pinyon House South	48
3.1. Incised millstone (O-1207)	50
3.2. Manos, pestle, and hammerstone from Pinyon House	52
3.3. Ceramic artifacts from Pinyon House	55
3.4. Humboldt, Little Lake, Elko series, and Untyped projectile points from Pinyon House	55
3.5. Rose Spring Corner-notched and Contracting Stem projectile points from Pinyon House	62
3.6. Cottonwood series projectile points from Pinyon House	66
3.7. Desert Side-notched projectile points from Pinyon House	67
3.8. Selected bifaces from Pinyon House	69
3.9. Selected roughouts and point blanks from Pinyon House	71
3.10. Selected drills, unifaces, and cores from Pinyon House	73
3.11. Miscellaneous artifacts of stone and worked bone from Pinyon House	77
3.12. Distal element (a. O-1270) and barb (b. O-76) of composite pinyon hook found at Pinyon House	83
3.13. Cone paddle (O-1257) from Pinyon House	84
3.14. Charred pinyon cone fragment (O-1675) from Structure 2, containing several ripe nuts	90
4.1. Distribution of major feature and artifact categories at Pinyon House	99
5.1. View of Two Eagles looking northeast toward Inyo Mountains and general vicinity of Pinyon House	111
5.2. Map of Two Eagles with surface collection grid system superimposed	112
5.3. Small pecked petroglyph from Two Eagles	114

5.4. Milling alcove associated with Structure 10	115
5.5. Exposed floor of Structure 2	116
5.6. Floor maps of Structures 2, 3, and 6 at Two Eagles	118
5.7. Floor Maps of Structures 8 and 9 at Two Eagles	119
5.8. Floor Maps of Structures 10 and 11 at Two Eagles	122
5.9. Floor Map of Structures 15, 17, and 19 at Two Eagles	123
5.10. Floor Maps of Structures 21, 23, and 25 at Two Eagles	124
6.1. Flat block millingsone (O-1131) from Two Eagles	130
6.2. Flat slab millingsone (O-1087, 1739, 1738, 1741) from Two Eagles	130
6.3. Selected manos and battered cobble from Two Eagles	131
6.4. Ceramic artifacts from Two Eagles	133
6.5. Great Basin Stemmed and Elko series projectile points from Two Eagles	137
6.6. Rose Spring Series projectile points from Two Eagles	138
6.7. Cottonwood Triangular projectile points from Two Eagles	138
6.8. Desert Side-notched projectile points from Two Eagles	139
6.9. Selected biface fragments from Two Eagles	141
6.10. Scraper planes from Two Eagles	143
6.11. Selected bladeflake flakes from Two Eagles	147
6.12. Miscellaneous artifacts of stone and bone from Two Eagles	156
7.1. Distribution of major feature and artifact categories at Two Eagles	158
8.1. View southwest across Crater Middens toward the Sierra Nevada crest	166
8.2. "A Mono Home"	167
8.3. Contour map of Crater Middens showing locations of structures and Middens I-V	168
8.4. Maps of Middens II and V at Crater Middens	170
8.5. Maps of Middens III and IV at Crater Middens	171
8.6. Bedrock Milling Features I.A. (Midden I) and II.A (Midden II) at Crater Middens	172
8.7. Bedrock Milling Feature II.B (Midden II) and III.A (Midden III) at Crater Middens	173
8.8. Bedrock Milling Features III.B (Midden III), IV.A (Midden IV), and V.C (Midden V) at Crater Middens	175
8.9. Stratigraphic profile of south wall of square S1E10 (Midden II), which is representative of cultural deposits throughout Crater Middens	177
8.10. Floor maps of Structures 3 (Midden I) and 7 (Midden II) at Crater Middens	179
8.11. Exposed floor of Structure 7 (Midden II) at Crater Middens	181
8.12. Floor maps of Structures 9 and 10 (Midden II) at Crater Middens	183
8.13. Floor maps of Structures 12 (Midden II) and 16 (Midden III) at Crater Middens	186
8.14. Exposed floor of Structure 16 (Midden III) at Crater Middens	188
8.15. Profile of strata preserved adjacent to north wall of Structure 16 (Midden III), Crater Middens	190
8.16. Floor maps of Structures 1 (Midden I), 2 (Midden I), and 5 (Midden II) at Crater Middens	191
8.17. Floor maps of Structures 6, 8, and 11 (Midden II) at Crater Middens	193
8.18. Floor maps of Structures 14 and 17 (Midden III) at Crater Middens	194
8.19. Floor maps of Structures 4 (Midden II), 13 (Midden II), and 15 (Midden III) at Crater Middens	195
9.1. Basin block millingsone (O-2057) from Crater Middens	203
9.2. Notched schist millingsone fragment (O-2217) from Crater Middens	207
9.3. Manos from Crater Middens	209
9.4. Manos and pestle from Crater Middens	210
9.5. Battered cobbles from Crater Middens	215
9.6. Undecorated Owens Valley Brown Ware rim sherds from Crater Middens	222
9.7. Decorated Owens Valley Brown Ware rim sherds and body sherds from Crater Middens	223
9.8. Grey ware rim sherds and decorated body sherds from Crater Middens	224
9.9. Miscellaneous ceramic artifacts from Crater Middens	226

9.10. Humboldt and Elko series projectile points from Crater Middens	228
9.11. Rose Spring Corner-notched projectile points from Crater Middens	231
9.12. Rose Spring and Eastgate projectile points from Crater Middens	234
9.13. Cottonwood Series projectile points from Crater Middens	235
9.14. Classifiable Desert Side-notched projectile points from Crater Middens	237
9.15. Unclassified Desert Side-notched projectile point fragments from Crater Middens	238
9.16. Selected green chert bifaces from Crater Middens	247
9.17. Miscellaneous chipped stone artifacts from Crater Middens	249
9.18. Complete shaft smoothers from Crater Middens	258
9.19. Selected artifacts of steatite from Crater Middens	261
9.20. Pendant and incised stones from Crater Middens	261
9.21. Selected artifacts of worked bone from Crater Middens	264
12.1. Cumulative frequency distributions of time-sensitive projectile points by phase from Pinyon House, Two Eagles, Crater Middens, 1972 Big Pine transect survey (Bettinger, 1975a), Cottonwood Creek (Iny-2), and Rose Spring (Iny-372)	328
12.2. Cumulative frequency distributions of obsidian hydration rim measurements from Pinyon House, Two Eagles, and Crater Middens, and time-sensitive projectile points by phase from all three sites pooled as shown in figure 12.1	332
12.3. Hypothetical completeness curves for an assemblage with high remaining utility, an assemblage with low remaining utility, and an assemblage that is intermediate in this respect	335
12.4. Cumulative completeness curves for bifaces from Pinyon House, Two Eagles, Crater Middens, and Gatecliff Shelter	335
12.5. Cumulative completeness curves for roughouts from Pinyon House, Two Eagles, Crater Middens, and Gatecliff Shelter	336